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COMPLETE SPECIFICATION

Process and Apparatus for the Manufacture of Heat and Sound Insulating Sheet Material of Bonded Glass Fibres

We, ALGEMEENE KUNSTVEZEL MAATSCHAPPIJ NAAMLOOZE VENOOTSCHAP, a Company organised under the Laws of Holland, of 261, Benoordenhoutseweg, The Hague, Holland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention concerns a process, by means of which can be obtained industrially panels plates sheets and the like composed of a web of glass fibre, rendered coherent by means of a thermo-setting bonding material so as to obtain heat and sound insulating material.

It is moreover an object of the present invention to provide plant for the operation of the process of the invention.

According to the invention there is provided a process for the manufacture of panels, plates and sheets of a web of glass fibre for thermal, acoustic or other insulation, characterized in that a stream of superheated steam is made to pass through the web at great speed, a heat hardening binding agent being uniformly distributed through the web, the passage of the steam through the web being effected in successive zones, restricted and limited throughout the entire mass of the web, by subjecting said web to a relative movement between it and the blowing system providing the steam, so that the passage of the steam may be successively brought about in the different zones of the entire mass of the web resulting in the practically instantaneous expulsion of the liquid, containing the excess binding agent, retained in the conglomerate, and the drying of the binding agent retained on the fibres by the passage of the steam through the spaces freed by the elimination of the impregnating liquid, and finally the hardening or polymerisation of the binder.

The process of the invention may be employed in the case of mats or felts of glass fibres which have been impregnated with a binder by dipping in a bath thereof, for example, a solution or emulsion, or suspension in water.

In the practice of the invention bonding material is preferably a resin or any polymerisable thermo-setting product, such as for example phenol-formaldehyde resin.

The treatment by the superheated steam may be carried out in a single application or several successive applications. For example, according to one method of carrying out the invention, there are utilised two or more currents of superheated steam acting successively on the mat, the first due to its pressure, serving to eliminate the binder vehicle and also the excess of binder, and the others effecting subsequently the drying and the hardening or polymerisation of the binder. The currents of superheated steam may have different temperatures and/or pressures. In particular the first may be at a lower temperature than the second.

The plant provided and necessary for the operating of the process according to the invention comprises at least one blowing apparatus, permitting the forcing of at least one current through the thickness of the web means by which the passage of this current can be limited to one or more restricted zones of the web; and means of effecting a relative movement between the web and the blowing apparatus, so that the passage of the gaseous current can be successively effected in the various zones of the entire mass of the web.

In order to obtain the desired state of polymerisation of the binder, the pressure of each of the currents of steam as well as the extent of the zone of application may be determined according to the thickness and density of the mat of glass fibres, the quantity of binder, the speed at which the

[Price 3s. 0d.]

mat is advanced through the blowing apparatus as well as the nature of the binder.

The accompanying drawing which will now be described illustrates diagrammatically an example of the combination of plant according to the invention.

The main part of the plant comprises a conveying system capable of feeding a mat or felt of glass fibre in direction (A), previously impregnated with a thermo-hardening bonding material under the action of a blowing unit (this unit does not form part of the plant of the invention) comprising, for example, a series of blowing mouths (2, 3 and 4) fed in their turn through suitable conduits respectively (5, 6 and 7) with gas, super-heated steam.

The said conveying system is conveniently constituted by two continuous moving bands or belts (8) and (9) moving respectively in the direction (B^1) and (B^{11}) and gripping between them the mat or felt (1), each part of which is consequently brought successively under the action of the steam issuing from the blowing mouths (2, 3 and 4), these latter being arranged as shown so as to direct the respective streams directly onto a restricted area of the surface of the said mat.

With the object of enabling the mat to be reached and passed through by these streams, the conveying bands or belt (8) and (9) are of perforated sheets, netting or equivalent systems.

With the object of forcing the whole quantity of the superheated steam through the thickness of the mat the plant comprises sealing means, diagrammatically indicated by 10, 11, 12 and 13 arranged at the sides of the blowing mouths in order to avoid escapes of steam, with consequent drops in pressure and efficiency, between the orifice of the blowing mouths and the surface of the mat opposite to them.

In a position opposite to the blowing mouths, the plant comprises collecting chambers respectively 14 and 15 receiving the steam currents after passing through the mat. In view of the fact that the stream ejected from the first blowing mouth 2 or any of the first blowing group causes, at the most, the elimination of any excess bonding material present in the mat, it is provided that the chamber fixed opposite 14 shall be put in communication with a plant or apparatus for recovery of the bonding material from the outgoing stream, whilst the chamber 15 in which at the most only steam is in practice collected, is put in communication with a system for reutilisation and recovery.

With the object of effecting a reduction of the thickness of the mattress or felt, so as to vary, in accordance with requirements, the dimensions and density or any of the characteristics, the plant includes means for altering the distance between the transporting members 8^1 and 9^1 of the transporting system, such as the pressure screws 16 and 17 adapted to bring together to a variable extent the opposing units for emission and collection of the streams.

What we claim is:—

1. A process for the manufacture of panels, plates and sheets of a web of glass fibre for thermal, acoustic or other insulation, characterized in that a stream of superheated steam is made to pass through the web at great speed, a heat hardening binding agent being uniformly distributed through the web, the passage of the steam through the web being effected in successive zones, restricted and limited throughout the entire mass of the web, by subjecting said web to a relative movement between it and the blowing system providing the steam, so that the passage of the steam may be successively brought about in the different zones of the entire mass of the web resulting in the practically instantaneous expulsion of the liquid, containing the excess binding agent, retained in the conglomerate, and the drying of the binding agent retained on the fibres by the passage of the steam through the spaces freed by the elimination of the impregnating liquid, and finally the hardening or polymerisation of the binder.

2. A process according to Claim 1 characterised in that the excess of the binding agent or any other element capable of being re-utilised, is recovered after having passed through the web.

3. A process according to Claim 1 characterised in that several streams of the steam are directed successively on to the web, the first streams being at sufficient pressure to effect the elimination of the excess of the binding agent, and the other streams being at a temperature suitable to effect the drying and the hardening or polymerisation of the binding agent.

4. A process according to any one of Claims 1 to 3 characterised in that the web of glass fibres is compressed before and during treatment.

5. Plant for the operation of the process according to any one of the Claims 1 to 4 characterised in that it comprises a blowing system having a blowing nozzle, permitting the forcing of a steam current through the thickness of the web, means by which the passage of this steam current can be limited to a restricted area of the web; and means for effecting a relative movement between the web and the blowing apparatus, which means is constituted by a pair of endless bands or belts which support the web and cause it to pass under

the blowing system, the moving bands or belts themselves being composed of mesh or perforated metal, or the like, permitting the steam current to pass through freely, gas-tight fittings or the like being provided so as to cause practically all the steam ejected from the nozzle to be forced through the thickness of the web.

6. Plant according to Claim 5 characterised in that it comprises a collecting chamber to collect the steam current on emerging from the web.

7. Plant according to one of Claims 5 or 6 characterised in that it comprises parts for varying the thickness of the web in such a manner as to vary the density before and during the treatment which effects the hardening of the binding agent.

8. Plant according to one of Claims 5 to 7 characterised in that the web is supported between two guides, these guides being movable in such a manner as to regulate the compression of the web.

9. A process for the manufacture of panels, plates and sheets from a web of glass fibres for thermal, acoustic or other insulation substantially as herein described.

10. Plant for the operation of the process as claimed in Claim 9 substantially as herein described.

Agents for the Applicants,
THURSTON EDWARDS & CO.,
Bank Chambers, 329, High Holborn,
London, W.C.1,
Chartered Patent Agents.

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1 SHEET

This drawing is a reproduction of the Original on a reduced scale.